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Emergence of Leatherback (Dermochelys coriacea) Hatchlings from the Nest at Playa Grande, Costa Rica

Jennifer Swiggs
Indiana University - Purdue University Fort Wayne

Pilar Santidrian Tomillo
Leatherback Trust

Emergence of leatherback (*Dermochelys coriacea*) hatchlings from the nest at Playa Grande, Costa Rica

Jennifer Swiggs[1]. Pilar Santidrian Tomillo[2]. Frank V. Paladino[1].
[1] Department of Biology, Indiana-Purdue University, Fort Wayne, Indiana USA.
[2] The Leatherback Trust, Goldring -Gund Marine Biology Station, Playa Grande, Costa Rica.

Introduction

This study was conducted at Parque Nacional Marino Las Baulas, Costa Rica, one of the most important nesting sites for leatherback turtles in the Eastern Pacific.

The emergence process-

- Leatherback nests are typically ~80cm deep, providing relatively cool, constant sand temperatures
- It takes, on average, 3.3 days for leatherback hatchlings to emerge from the nest after hatching[3].
- Group facilitation of hatchlings reduces energy expenditure required to successfully emerge[1].
- Hatchlings movements' are restricted by temperature[2].

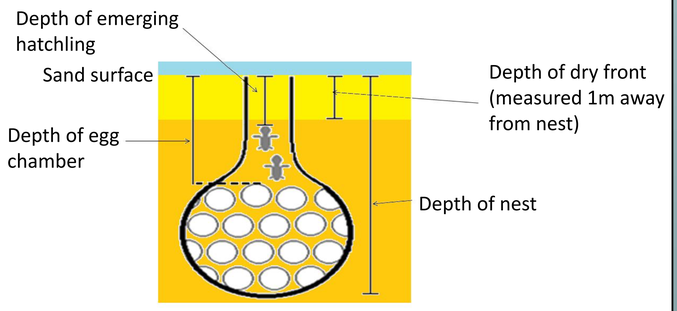
During the emergence process hatchings alternate between periods of activity and periods of rest, they scratch sand from the roof, packing it into the floor, elevating them away from the egg chamber.

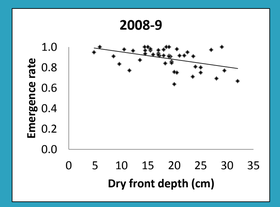
This investigation aims at assessing the nest environment where hatchlings fail to emerge.

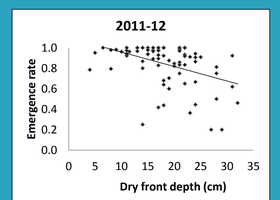
Methods

- This investigation was conducted over three nesting seasons.
- Nest and sand temperatures were recorded on alternate days throughout each season.
- Excavations were preformed two days after observation of successful emergence. Figure 1 illustrates measurements taken during excavations.

Figure 1. Measurements recorded during excavations.







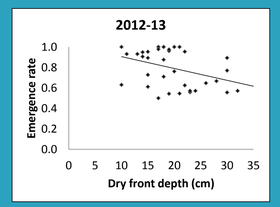
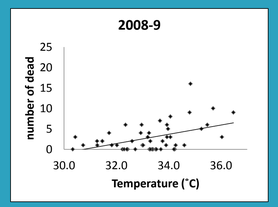
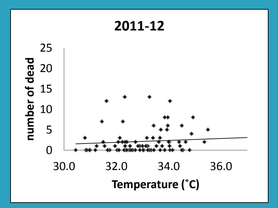


Figure 2. The effect of depth of dry front on emergence rate (ER).





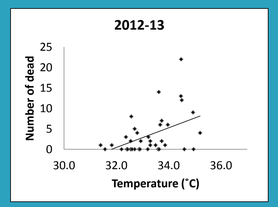
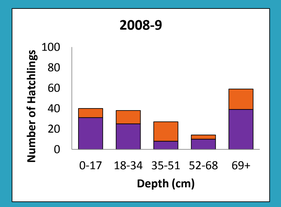
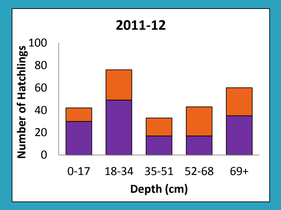


Figure 3. The effect of temperature on the number of dead hatchlings found in the nest.





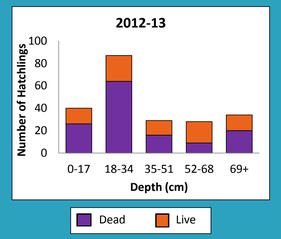


Figure 4. The depth of hatchlings that failed to emerge.

Results

- Emergence rate decreased as the season progressed in 2008-9 (R^2 = 0.147, p = 0.001), 2011-12 (R^2 = 0.078, p = 0.006) and 2012-13 (R^2 = 0.301, p < 0.001).
- The most important factor affecting emergence rate was the dry front in 2008-9 (R^2 = 0.19, p = 0.002) and 2011-12 (R^2 = 0.17, p <0.001) and the dry front and the temperature in 2012-13 (R^2 = 0.32, p = 0.01) (Figure 2).
- Increasing temperatures in the egg chamber resulted in a higher number of dead hatchlings in 2008-9 (quadratic R^2 = 0.289, p <0.001) and 2012-13 (quadratic R^2 = 0.209, p = 0.05), but the relationship was not significant in 2011-12 (p = 0.255) (Figure 3).
- In 2008-9, 2011-12 and 2012-13 seasons: 88, 106, and 83 live hatchlings and 156, 193 and 155 dead hatchlings were excavated (Figure 4).
- The depth of the dry front increased as the season progressed in all years. 2008-9 (R^2 = 0.154, p = 0.001), 2011-12 (R^2 = 0.164, p <0.001) and 2012-13 (R^2 = 0.485, p<0.001).
- The temperature of the sand profiles increased with seasonal progression in all years, with shallower depths experiencing the greatest increase.
- The number of dead hatchlings found in the dry front increased with seasonal progression in 2008-9 and 2012-13 seasons but decreased in 2011-12 season.

Conclusions

- Temperature and dry front have a negative effect on hatchlings ability to excavate themselves from the nest.
- Both temperature and dry front increase with seasonal progression.
- The dry front above the nest is the most hostile environment for the emerging hatchlings, with the highest temperatures recorded and seasonal increase in percentage of dead hatchlings found in this location.

Future study

- Shading nests to decrease nest temperatures.
- Watering nests to reduce temperature and increase sand water content.

References

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Acknowledgments

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